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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/021,767	12/12/2001	Zhiqiang Zhang	AD207/2001	2213

7590 03/18/2003

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EXAMINER

LISH, PETER J

ART UNIT	PAPER NUMBER
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1754

DATE MAILED: 03/18/2003

6

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/021,767	Applicant(s) ZHANG ET AL.	
	Examiner Peter J Lish	Art Unit 1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☒ Claim(s) 8,9,11,15 and 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>5</u> . | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Claim Objections

Claims 8, 9, 11, and 15-16 are objected to because of the following informalities: A) Regarding claims 8, 9, and 11, the claims are improperly phrased. The claims should be phrased "A method according to claim ___ wherein the dispersant....". B) Regarding claims 15-16, the use of the term "other", and especially the use of quotes around the term, is unnecessary. C) claim 8 is in improper ^{form} as it contains more than one sentence. Claim 8 should be rewritten as a single sentence.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3 and 6-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 states that the carbon nanotube "is not required, but may optionally be surface treated....". It is indefinite as to whether the part of the claim that follows this phrase is meant to be a limitation of the claim.

Claim 6 states that the nanotube is added to the liquid, followed by addition of dispersant. This claim is dependent upon claim 5, which states that the dispersant is added to the liquid,

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followed by addition of the nanotube. Claim 6 contradicts the claim to which it depends upon and is thus indefinite as to what the applicant regards as the invention.

Claims 7 and 10 state that the liquid medium “can be...”. It is indefinite as to whether the part of the claim that follows this phrase is meant to be a limitation of the claim.

Claim 8 states that the dispersant is of “the type used in the lubricant industry”. This phrase is indefinite as to the dispersants included in the limitation. Claim 8 also states “more typically, the dispersant can be...”. It is indefinite as to whether the part of the claim that follows this phrase is meant to be a limitation of the claim.

Claim 9 states that the dispersant is included in a package “typical sold in the lubricant industry”. This phrase is indefinite as to the dispersants included in the limitation.

Claim 11 states that the dispersant have an HLB of above 10. This claim is dependent upon claim 8, which states that the dispersant have an HLB of below 8. Claim 11 contradicts the claim to which it depends upon and is thus indefinite as to what the applicant regards as the invention.

Claim Rejections - 35 USC § 102 and 103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 are rejected under 35 U.S.C. 102(b) as being anticipated by Bonard et al.

(“Purification and Size-Selection of Carbon Nanotubes”).

Bonard et al. disclose a method for the production of dispersed colloidal suspensions of carbon nanotubes in aqueous solutions by the combined use of dispersants and sonication. The dispersal agents, or surfactants, of Bonard et al. are soluble in water and act to give the surface of the carbon nanotubes a hydrophilic surface.

Claims 5-6, 8, 11, and 13-16 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bonard et al.

Regarding claims 5-6, Bonard et al. do not explicitly teach the order in which the nanotubes and dispersant are added to the solvent. However, it is reasonable to expect that Bonard et al. either added the nanotubes followed by the dispersant, or added the dispersant followed by the nanotubes. Alternatively, it would have been obvious to one of ordinary skill at the time of invention to add the nanotube and dispersant in any order, as the order of addition has no effect on the dispersion.

Regarding claim 11, the surfactants include an ionic surfactant SDS, or sodium dodecyl sulfate, and a non-ionic surfactant Synpchronic NP10, both of which have an HLB of greater than 10 (SDS: HLB = 40, NP10: HLB = 13.6). Regarding claim 8, Bonard et al. teach the use of a surfactant, Span 80, which has a HLB of below 8 (Span 80: HLB = 4.3) in a tetradecane solvent

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(footnote [19]). Regarding claims 15-16, Bonard et al. teach that other nanoparticles are also contained in the nanotube dispersion.

Regarding claims 13-14, there is no difference seen between the dispersion of Bonard et al. and that of applicant. Furthermore, it would have been obvious to one of ordinary skill at the time of invention to add differing amounts of nanotubes to the solvent in order to create dispersions with different viscosities.

Claims 1-2, 4-5, 7-8 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Davey et al. (EP 0949199 A1).

Davey et al. disclose the dispersion of carbon nanotubes in organic solvents. The nanotubes are added to solvent which includes a coiling polymer dispersant in order to form a solution. The dispersant may include polymers such as polyacetylene, poly(sulphonic acid), poly(dioctyl fluorene), poly(m-phenylene-co-2, 5-dioctoxy-p-phenylenevinylene), or other coiling polymers. These polymers are expected to have an HLB of below 8. The solvent is an organic solvent, such as an arene aromatic hydrocarbon. The nanotubes are sonicated into a mixture of the solvent and polymer.

Claims 13-14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Davey et al.

There is no difference seen between the dispersion of Davey et al. and that of the applicant. Alternatively, it would have been obvious to one of ordinary skill at the time of

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invention to add nanotubes is different amounts in order to create dispersions with different viscosities.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Lish whose telephone number is 703-308-1772. The examiner can normally be reached on 9:00-6:00 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 703-308-3837. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-305-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

PL
March 5, 2003


STUART L. HENDRICKSON
PRIMARY EXAMINER